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Hi, Tony — are they going to blindfold you next — and then..... bang!
Ette

PERSONNEL

Didn't know we had NWR's in space!

1. Anthony D. Leger, Satellite Manager, GS-9, PFT, EOD 1/25/81

Tony - You're doing a beautiful job -- you are to commend yourself. Do miss you and wish you were still at MNT.
Judy McN

REVIEW & APPROVALS

Anthony D. Leger 3/11/82			
Submitted by	date	Area Office Approval	date
Gaylord [illegible] 3/11/82			
Reviewed by	date	Regional Office Approval	date

A. HIGHLIGHTS

1981 was the first year that Barnegat Refuge was permanently staffed. On January 25, Anthony Leger entered on duty as the first full-time satellite manager. Prior to that time, the refuge was staffed intermittently by biological aides and Brigantine Refuge staff.

In early February, a "temporary" office was established in Barnegat Township. This 100 square foot office, donated by the Township of Barnegat, served as a base of operations for the remainder of the year. A 16.7 foot Boston Whaler and a 4WD Chevy Blazer were quickly obtained and refuge operations were underway.

Much time was spent documenting problems, updating reports, getting a handle on mosquito control (both chemical and mechanical), enforcement, wildlife surveys, and tackling the ever-present backlog of posting and reposting the refuge boundary. A major public relations effort was undertaken to inform the public of the existence and benefits of the area. This is especially important at this refuge where land acquisition is continuing.

The endangered peregrine falcon nested on the refuge for the second year in a row. Three young falcons fledged from the nesting platform.

B. CLIMATIC CONDITIONS

Temperatures during the year ranged from -6^{O} to $99^{O}F$. January was colder than normal with bays and tidal creeks freezing over for a two week period. Thawing occurred before wildlife populations showed any unusual winter losses.

Precipitation was 7.37 inches below the recorded mean of 39.71 inches (recorded mean based on data from 1958-1980). Although it was warmer and drier than usual, no negative impacts on the habitat or wildlife was noted. See section G-17.

C. LAND ACQUISITION

1. Fee Title

Barnegat National Wildlife Refuge was established on June 6, 1967, by the Migratory Bird Conservation Commission. Fee Title acquisition began that year and continues today. The original proposal included 4,771 acres of saltmarsh in Barnegat Bay. Also in 1967, a lease was negotiated with the American Telephone and Telegraph Company (ATT) to have the USFWS manage 2,384.9 acres of saltmarsh as part of the refuge. Acquisition proceeded slowly in the late 1960's and early 1970's due primarily to a lack of funds.

In 1974, 4,043.9 acres were added to the refuge - bringing the total acquired to 5,192 acres. The bulk of the 1974 acquisition was the purchase of nearly 4,000 acres (Little Egg Harbor Division) from The Nature Conservancy. In 1978, the refuge boundary was increased to include some additional saltmarsh islands in Barnegat Bay, a bottomland hardwood buffer zone on the western boundary, and inholdings in the Little Egg Harbor Division (LEH). The total proposed refuge acreage is now 11,800 acres. Nice progress. no Pete

The following chart shows fee title acquisition since CY 1974.

Calender Year	# of Acres Acquired	Total Acreage (FEE)
1967 - 1973	1148.230	1148.230
1974	4043.900	5192.130
1975	43.100	5235.230
1976	85.600	5320.830
1977	269.200	5590.030
1978	3.220	5593.250
1979	117.075	5710.325
1980	292.540	6002.865
1981	955.270*	6959.135

*Includes 356.6 acres of shallow bay purchased in association with tract #227.

Total refuge acreage, including the leased ATT property, is 9344.035 acres.

Tract numbers 4i, 4j, 29, 35, 118, 118a, 214, 215, 216, 216a, 227, 227a-s, 227-I, 228, and 228a-e, totaling 955.27 acres were acquired in 1981. In addition, Quit-Claim deeds were negotiated on tidal creeks within and among these tracts totaling 4.25 acres. The 356.6 acres of shallow open bay is a major resting and feeding area for over 6,000 Atlantic brant.

Low market values for high marsh (Spartina patens) and bottomland hardwoods tracts have hampered acquisition of this property in the past. Hopefully, surveys and appraisals conducted by regional realtors in 1981 will lead to higher appraised values for these properties so that they can be acquired in the near future. Increased emphasis must be placed on acquiring the "fringe" (bottomland) areas if we are to protect these tracts from timber cutters and housing developers. The enactment of the New Jersey Pinelands Act, has placed increased pressures on these areas within the approved refuge boundary. ? SHK

The existence of inholdings within the refuge boundary hinders effective management of the unit. Private parcels along dirt roads provide unlimited access to refuge property for legal and illegal activities. When these areas are included in the refuge they can either be upgraded to provide access for approved programs or closed if necessary.

3. Other

In 1977, the lease agreement with ATT was renewed through June 1987. The 2,384.9 acres protected by this agreement form an integral part of

the refuge. The tract contains an exceptional mix of saltmarsh, ponds, tidal streams, and hardwood knolls. A narrow strip of bottomland hardwoods is located on the western edge of the property. The lease agreement stipulates that the area be closed to all forms of public use. The ATT facility is operational.

D. PLANNING

1. Master Plan

Barnegat Refuge is scheduled for formal master planning in FY 1986.

2. Management Plans

During 1981, data was collected to aid in the preparation of various refuge management plans. The wildlife inventory plan, hunting plan, public use plan, and trapping plan are scheduled for completion/revision in early 1982.

3. Public Participation

Public participation in the planning process was facilitated through establishment of the refuge office in early 1981. In the past, local people had to call or travel to Brigantine Refuge to voice their opinions on refuge management. Many locals were not even aware that the refuge was administered from Brigantine. The permanent manning of Barnegat has brought the administration of the area closer to the people most affected by our decisions. A great deal of time throughout the year was spent listening to people's gripes, suggestions, etc. on general refuge management. In addition, public comments were solicited on the Ocean County Mosquito Extermination Commission (OCMEC) proposal to perform Open Marsh Water Management (OMWM) on 322 acres of the refuge (See F.10). A few phone calls were received from interested parties seeking information on the proposal. No written comments were received.

Numerous verbal complaints relating to past and present practices of the OCMEC were received throughout the year. Some complaints dealt with pesticide application, but most dealt with past marsh alteration schemes. As yet, no one has put these complaints in writing but many long time local residents hold bitter feelings toward the Commission for what they consider to be their systematic destruction of the saltmarsh.

4. Compliance with Environmental Mandates

Two environmental assessments were prepared during the year, both dealing with the former Popular Point Mosquito Control Impoundment. The first dealt with the effects of breeching the dike and returning the impoundment to tidal influence. The second assessment addressed the effects of proposed open marsh water management on the impounded area after returning it to tidal influence. See section G-17.

5. Research and Investigations

Barnegat NR81 - "Evaluation of the Effects of Bacillus thuringiensis var israelensis (BTI) on Salt Marsh Mosquitos and Macroinvertebrate Populations" (5-1230-1)

By: Dr Joseph K. Shisler and Dr. Donald J. Sutherland -- both of Rutgers University

The objectives of this project are as follows:

1. To determine the efficacy of various concentrations of BTI in controlling the salt marsh mosquito in its breeding habitat, and;
2. To assess the effects of various concentrations of BTI on salt marsh macroinvertebrates.

BTI is a biological insecticide consisting of spores and crystals of the bacteria, Bacillus thuringiensis var israelensis. BTI is toxic to mosquito and black fly larvae. The toxic action of the pathogen appears to be a function of ingestion while feeding. Good kill rates have been observed in laboratory and limited field tests performed on mosquito larvae. Very few effects have been noted on non-target organisms tested, including; fish, crustaceans, and aquatic insects. BTI was approved by the EPA for experimental field use during 1981.

Ten, ten acre plots were to be utilized for this study. All plots received a minimum of eight treatments of Abate during the 1980 breeding season. Duplicate plots were selected for treatment with BTI at concentrations of 0.25, 0.75, and 1.50 pounds per acre of formulation. In addition, duplicate plots were selected for untreated controls and treatment with Abate 4E.

Mosquito populations (larval) were to be sampled one day before application and one and four days after application. The entire experiment was to be duplicated two weeks later. Effectiveness (kill), cost, application efficiency, and effects on other organisms were to be studied.

This study was to be completed within a six-week period in the late summer/early fall of 1981. Problems were encountered and the entire experiment was not completed. Spraying was conducted on August 26. Due to the fact that mosquito populations were low, only four plots were treated. Three were treated with BTI concentrations of; 0.10, 0.50, and 1.0 lbs./acre in one gallon/acre final spray. One plot was treated with Abate 4E at 1.5 oz. of active ingredients in 4oz. final spray/per acre.

The stated reason for the lower concentrations of BTI was, "in consideration of economy of a practical mosquito program", i.e. cost of application. Problems were encountered with the wettable powder formulation of BTI. The spray nozzles on the helicopter clogged and incomplete coverage was experienced. In short, the experiment was not conducted as planned. The resulting kill was not good. Post-treatment monitoring was not completed due to very high tides four days after

spraying. The study failed to achieve its' stated objectives. The study will be repeated in 1982, possibly with a different formulation of BTI (granular) in an attempt to gain more reliable information on the bacteria.

NOT NEAR AS BAD AS S. FLORIDA. FF

Dip sample for mosquito larvae. --ADL

Other informal research and investigations continued in 1981. The OCMEC monitored mosquito production in conjunction with their control program. The Peregrine Fund, Inc. monitored falcon activity at the nesting platform on ATT property.

E. ADMINISTRATION

1. Personnel

Anthony D. Leger (Refuge Manager GS-485-9) entered on duty on January 25, 1981, as the first permanent satellite manager for Barnegat Refuge.

The FY81 budget request for Barnegat staffing states that funds will be used to support a PFT Manager, a part-time GS-5 Biological Aide, and a part-time GS-4 Clerk. Due to various freezes in effect throughout 1981, no additional staff were hired. Discussions throughout the year between Brigantine, Barnegat, and HAO on the need for additional manpower at Barnegat resulted in deciding that a maintenance man (WG 5/6) would best fit current needs. A maintenance man will be hired at the first opportunity.

2. Youth Programs

No youth program personnel were stationed at Barnegat Refuge during the year. Approximately 50 man-days of work were completed by the

Brigantine YCC. Projects included litter pickup and salvaging illegally cut cedar logs. YCC enrollees did a good job dismantling parts of a cordoroy road built by illegal wood cutters.

The Lakehurst Naval Base YACC camp also provided assistance in 1981. Approximately 100 enrollee-days were spent on the refuge salvaging illegally cut cedar, clearing cut over areas, boundary clearing, posting, erecting an interpretive sign, litter pick-up, and brushing out roads and signs.

Refuge Sign on East Bay Avenue, Barnegat. --ADL

5. Funding

Fiscal Year 1981 was the first year that Congress allocated funds for Barnegat Refuge. $53,000 was allocated for; salaries, transportation equipment, travel expenses, and supplies. The budget is part of the Brigantine Refuge budget. Funding is adequate at present, but as refuge programs develop and staff are added, increased funding will be needed.

6. Safety

Barnegat Refuge operates under Brigantine Refuge's safety program. No accidents were reported in 1981.

8. Other Items

A temporary office was set up in February of 1981. With the establishment of the satellite office, nearly all reporting, documentation, and administration of the refuge was taken over by the satellite manager. Brigantine Refuge continued to provide guidance, clerical support, law enforcement assistance, etc.

What the Hell! Our constituents are supposed to be literate!!

AMEN - no need to treat anyone like they are 5 yrs old. wm

Pretty, but "wordy"

F. HABITAT MANAGEMENT

1. General

During the last 3-5 years, Barnegat Refuge has evolved into a cohesive, manageable unit. The refuge is mainly in a protective mode and has been since its inception. Nesting populations of waterfowl are not large, but do exist and probably can be augmented through management. In general, the thrust has been to acquire, post, protect, and let nature take its course. In the future, we must take a more active management posture to insure that wildlife diversity is maintained or increased. This is necessitated by increasing human population and demand for additional recreational resources--which will place increasing pressure on refuge resources.

Land types and approximate acreages for Barnegat Refuge are as follows:

Saltmarsh Cordgrass	5000 acres
Salt Hay	2500 acres
Bottomland Hardwoods	1200 acres
Fresh/Brackish Marsh	200 acres
Upland (mainly non-com. forest)	100 acres
Shallow Bay	357 acres

2. Wetlands

Freshwater marsh occurs only along a transition zone between the wooded swamps and the saltmarsh. Two areas of cattail/sedge marsh are located in the northern unit where the OCMEC has plugged the outlets of freshwater streams.

Freshwater marsh - Collinstown Road Stop Ditch. -- ADL

The saltmarsh ecosystem is one of the most productive habitats known to man. Management of saltmarsh at Barnegat takes the form of protection. A few hundred acres of undisturbed saltmarsh exists in the Barnegat Township portion of the refuge, but most of the refuge has been ditched at some time in the last 100 years.

Open Marsh Water Management (OMWM) was performed on portions of a 332 acre tract in Stafford Township (see F-10).

3. Forests

Most of the refuge's 1300 acres of forests are bottomland hardwoods. Pine and cedar knolls are interspersed throughout the bottomland areas with some knolls extending into or occurring on the saltmarsh. The bottomlands are composed of; red maple, black gum, sweet gum, sassafras, atlantic coast white cedar, sweetbay magnolia, and various oaks, among others. These wooded areas provide a buffer zone on the upland edge of the refuge as well as a great deal of edge--which benefits numerous species utilizing the refuge.

The unfortunate theft of over 100 atlantic coast white cedar trees necessitated some emergency forest management. See section H-17. White cedar is disappearing rapidly from this area. It is an important component of the bottomland areas and provides winter cover and food for deer, ruffed grouse, woodcock, and songbirds. Probably less than 100 acres of white cedar remain on Barnegat Refuge. In conjunction with the salvage operation in cutover areas, openings were created by removing slash from the areas. Tops and limbs were piled around the openings. Five openings totaling about two acres were created adjacent to and among the uncut cedar. Existing brush and competing trees were removed where possible. A number of red maples were removed or girdled to open the area to sunlight and to remove the seed source of competing tree species. All live cedars were left standing It is hoped that the decreased competition and increased sunlight will favor the reestablishment of white cedar stands in this area.

8. Haying

Salt hay cutting was a common activity before Service acquisition, but currently is not permitted on the refuge. Haying still takes place on private lands within the approved boundary.

Portion of marsh cut for salt hay. *--ADL*

10. Pest Control

Mosquito control has been an annual undertaking on Barnegat for many years. The target species is Aedes solicitans, although in late spring Aedes contada is the target. Mosquitos are controlled for two reasons: 1. because they are pests and 2. to lessen the chances of an encephalitis outbreak. Reason #1 is 99% of the justification for mosquito control. Terry!! You are destroying all of my cherished Microbes!! Hewitt

The saltmarsh mosquito requires certain conditions in order to successfully reproduce. The female lays her eggs on exposed mud surfaces in the marsh. When the area is flooded, either by rain or very high tides, the eggs hatch and larvae appear. Development time varies, but in very warm weather adults may emerge in 5 to 7 days. Control on Barnegat is geared toward the larval stage.

Alteration of the marsh was used to prevent adult mosquitos from breeding or emerging. In past years, "grid" ditches were dug to drain the marsh in an attempt to stop mosquito breeding. Years later, flooding, stop ditches, and small impoundments were used in an attempt to interrupt the reproductive cycle.

Presently, the main method is chemical control--insecticides applied to the saltmarsh by helicopters. In past years, chemicals such as DDT and Paris Green were applied. DDT was discontinued in 1969. Four Special Use Permits for mosquito control were issued in 1981 to the Ocean County Mosquito Extermination Commission authorizing spraying with the following: chemicals (Abate 4E and Abate 5G), growth inhibitors (Altosid SR-10), and light oil (Flit/MLO), which prevents the adults from breaking through the surface tension of the water.

What's this do to the food chain ultimately waterfowl + other wildlife? Can't be good. LL

The following table summarizes pesticide applications at Barnegat in 1981:

Substance	Amount
Abate 4E	2365 pounds (active ingredient)
Abate 5G	213.65 pounds (a.i.)
Altosid SR-10	173.05 pounds (a.i.)

The cummulative acreage treated in 1981 was 25,979.91. 7135 acres of refuge marsh were subjected to treatments, so the average area of saltmarsh was treated 3.64 times.

In the late 1970's, Open Marsh Water Management emerged as the method for "permanent" mosquito control. The thrust of this method is to control mosquitos by eliminating breeding habitat through temporary (tidal) or permanent (ponds and radials) flooding. OMWM is geared towards encouraging killifish (Fundulus spp) entry into serious breeding areas. Killifish are major predators of mosquito larvae.

The mosquito commission believes that OMWM is the best method of mosquito control. In the project area this management involves the following practices: Tidal ditching - ditches were cleaned and connected to insure good tidal flow throughout the area. Ponds - where a number of breeding depressions occurred in close proximity to one another a pond was created. Both tidal and non-tidal ponds were built. Non-tidal ponds contained a three foot deep reservoir to maximize the survival of Killifish. A special use permit was issued to OCMEC to perform OMWM on 322 acres of refuge saltmarsh. Standards for OMWM appear in Appendix I.

OMWM does control mosquitos. Areas that have been managed generally do not require aerial spraying to control mosquitos. OMWM also changes the marsh. The rotary ditcher is supposed to spread the spoil to a thickness of only two inches. This is not always the case. Woody vegetation (primarily groundsel bush and high tide bush) is often found along ditches after management has been performed. Salt pannes become deeper ponds and shorebird habitat is lost. At the same time, the new ponds provide waterfowl habitat. So some saltmarsh is lost or changed. For instance, areas that contained saltmarsh cordgrass before management might be open water, brush or salt hay, all due to elevation changes.

Pond created by rotary ditcher. *--ADL*

Rotary ditcher. *--ADL*

Move over to these houses! BP

11. Water Rights

Most of Barnegat Refuge is saltmarsh and, as such, is subject to the influence of the tides. The State of New Jersey has historic claim to "all lands now, or formerly flowed by tides". These claims have clouded titles of homeowners and landowners (including USFWS) alike. In the case of the refuge, these riparian claims hamper management and enforcement activities.

In November of 1981, a constitutional amendment passed limiting state riparian claims to; "those lands now or formerly flowed by tides (within the last 40 years)". The amendment also requires the State to exert its claims within one year from the date of its passage. The State will probably claim ownership to nearly all tidal creeks and ponds, some silted in creeks, and many border areas. In many cases, the USFWS has negotiated "quit-claim deeds" with the previous owners of these areas. In some cases we have bought riparian rights which the State had previously deeded to former landowners (High Bar Islands). In others, we have acquired the riparian rights from the state during condemnation proceedings. However, most refuge property has been acquired in fee title and some of this may be subject to State claims. In addition, the State may claim portions of the ATT tract which is leased to the refuge.

If State claims are honored, the implications for public use and wildlife management are serious. At present, the USFWS officially claims all lands to the present mean high water line and control over the creeks and ditches as far as waterfowl hunting and trapping are concerned. We make no attempt to limit passive recreation from refuge waters as long as the activity occurs from a boat (ex. fishing, clamming, and sightseeing). If ownership of edges and ponds were vested in the State, we may not have control over crabbing and fishing from banks. Waterfowl hunters could anchor their boats and even build blinds in these edge areas, and hunting would occur without any regard for the refuge's approved hunting plan and special regulations.

The Riparian Rights issue will come to a head in 1982. The State has and is conducting surveys to determine where their claims lie. The USFWS has two choices when claims are made; negotiate with the State and either purchase the property outright or enter into a cooperative agreement for management. Total State control is not considered an option if effective refuge management is to take place.

12. Wilderness and Special Areas

No officially designated wilderness areas exist on Barnegat Refuge.

The knolls throughout the marsh have been used for hundreds of years, first by Indians and then white men who literally lived off of the marsh. In addition, the Salt Works Knoll in the Barnegat Township area of the refuge was used by Washington's army during the Revolutionary War. Some historic artifacts may be buried in these areas.

G. WILDLIFE

1. Wildlife Diversity

The coastal ecosystem of Barnegat Refuge provides food and cover for a variety of waterfowl, waterbirds, birds of prey, and small mammals. To date, very little management other than protection has been directed towards wildlife. Open Marsh Water Management, (F-10) provides additional edge and shallow water areas throughout the marsh. Waterfowl and wading birds benefit from this activity which provides feeding and resting areas. Small elevation changes, related to spoil disposal may benefit waterfowl production.

2. Endangered and/or Threatened Species

The endangered bald eagle uses the refuge as a resting and feeding area during migration. The state listed endangered american osprey is common in migration (10 individuals present, fall 1981). One active osprey nest was located in 1981. Two young were produced.

The endangered peregrine falcon nests on the refuge. The active nest is a direct result of the Peregrine Fund's releases of falcons over the last several years. The nest is in a former hack-box atop telephone poles on the ATT portion of the refuge. In June, 3 young fledged from the nest box. Two of the birds were wild-produced birds and the third was planted in the nest by the Peregrine Fund personnel. This is the second consecutive year that the falcons have produced wild young.

3. Waterfowl

Barnegat Refuge was established as a wintering area for the black duck, and Atlantic brant. However, the refuge also supports sizable fall and winter populations of lesser scaup, bufflehead, and oldsquaw. These birds frequent the open bay, coves, and tidal streams throughout the refuge. Atlantic brant frequent the refuge from late October to early April. Populations on the refuge vary from 6-12,000 birds (approximately 10% of the population). The brant are usually found near saltmarsh islands in the bays or along the saltmarsh bayfront--usually not far from sea-lettuce or eelgrass beds. Approximately 50% of the refuge brant population utilizes the High Bar Islands area.

I shot a lot of Black Ducks there while working here BH

Black ducks are found throughout the saltmarsh in small groups. When the marsh and bay areas freeze up, most blacks leave the area for open water. As much as 10% of the Atlantic Flyway population of black ducks utilizes the estuarine habitat between Barnegat and Brigantine Refuges.

Blacks, mallards, and gadwalls nest on Barnegat. Nesting areas are mainly low earthen dikes, spoil areas, high marsh and scattered knolls. Production is not high and no management specifically geared to increasing duck production has occurred to date.

Canada and snow geese utilize the area in migration and a few winter in ponds throughout the refuge. Most, however, winter at Brigantine 20 miles south.

4. Marsh and Water Birds

Numerous marsh and water birds use the refuge throughout the spring, summer, and fall. Great blue herons, little blue herons, green herons, common egrets, snowy egrets, louisiana herons, american bitterns, and black-crowned night herons rest and feed in shallow water refuge ponds, creeks and ditches. No rookeries are known to exist on the refuge.

Small numbers of clapper rails nest throughout the refuge along tidal creeks and ditches.

5. Shorebirds, Gulls, Terns and Allied Species

Nesting colonies of laughing gulls, herring gulls, great black-backed gulls, common terns, and black skimmers are found on saltmarsh islands throughout Barnegat Bay. A 4-5000 bird laughing gull colony is present at the High Bar Islands.

American oystercatchers and willets nest in association with gull and tern colonies and in other areas scattered throughout the refuge.

Shorebirds are most numerous in migration. Limited nesting occurs on refuge.

6. Raptors

Barnegat Refuge is ideal habitat for many raptors--both migratory and resident. Red-tailed hawks, great horned owls, and screech owls all nest in wooded refuge areas. Marsh hawks are suspected nesters.

As many as 50 marsh hawks winter on the refuge. Rough-legged hawks and short-eared owls are common winter residents. All frequent the marsh and wooded edges where abundant rodent populations provide ample food. Accipiters are common during migration.

7. Other Migratory Birds

Mourning doves are common along roads and in woods openings on the area. Passerine birds are common both in winter and in migration. White cedar stands provide good winter habitat for passerines.

8. Game Mammals

White-tailed deer, red and gray fox, raccoon, and cottontail rabbits are common. Prior to establishment of the refuge, all these game mammals were hunted and trapped. Now, no hunting or trapping of these species is allowed due to the limited amount of habitat available.

Muskrats are found mainly in the "fringe" areas along the swamp/marsh ecotone and in shallow fresh marshes adjacent to streams.

10. Other Resident Wildlife

Approximately 150 bobwhite quail occur on the refuge. Ruffed grouse (100) are found in the heavily forested bottomlands.

Diamondback terrapin are found throughout the saltmarsh. Snapping turtles are also common. Red-backed and spotted salamanders are present in bottomland hardwoods areas.

17. Disease Prevention and Control

Prior to becoming part of the refuge, Popular Point was diked off and lagoons were dug in preparation for housing development. The haphazard encroachment turned the area into a major breeding ground for mosquitos. In 1978, the OCMEC upgraded the dike area and placed a water control structure in the dike. A "mosquito control impoundment" was thus created. As no freshwater source was available, water was pumped in (occassionally) from adjacent Mill Creek in times of low water. The impoundment was plagued with botulism from the outset. Botulism was reported in 1978, 1979, and 1980. Ducks and wading birds were affected. Yearly duck production in the area was generally lost to the disease.

In 1981, work began on returning the impoundment to tidal influences. After much discussion and two environmental assessments, the OCMEC cut breeches in the dike in 9 places and removed the water control structure. This returned tidal activity to some of the area. OMWM begain in late June. Problems with the rotary ditcher delayed work throught much of the summer. Work picked up in the fall and by winter 95% of the impoundment had been "managed". Despite a summer with less than average rainfall, no botulism occurred on the refuge in 1981. Botulism was reported from two lagoon housing developments adjacent to the refuge.

H. PUBLIC USE

1. General

Public use at Barnegat Refuge is primarily of the consumptive type. Historically, people fished and hunted as a means of earning a living in the Barnegat/Manahawkin Bay area. Although there are still a number of professional clammers and fishermen in the area, most of the use is now recreational in nature.

14,719 total visits were reported in 1981. Of these, 9620 were considered saltwater fishing visits. An additional 1042 visits were made by waterfowl hunters.

Ocean County was the fastest growing county in New Jersey--and perhaps the country--between 1970 and 1980. This growth followed a period of unprecedented growth in the 1960's as well. Some local towns exhibited a 400% population increase in the 1970's. In the last 30 years, the

area has changed from a mostly rural, farming-type area, to a bedroom community for Atlantic City and North Jersey. In addition, the local economy is growing. The area remains a summer escape for residents of North Jersey/New York City/Philadelphia--all are within an easy 2 hour drive of the refuge. Long Beach Island, the 24 mile long barrier beach that protects the marshes, has experienced fantastic growth. In the early 1960's, it was comprised of four small boroughs scattered along its length. Now it is nearly fully developed, with a large number of the new homes being uear-round residents.

With this growth has come an increased demand for recreation on and around the refuge. Much of the use is still of the water-based, consumptive type, primarily fishing, clamming, and crabbing; but increasing numbers of people are interested in more passive uses of the refuge, including; photography, hiking, birdwatching, canoeing, etc. Also, local school districts are making increased demands for environmental education facilities and activities.

2. Outdoor Classrooms - Students

The Ocean County Parks and Recreation Department utilized the refuge for public tours at various times during 1981. Marsh walks and canoe trips were among the activities conducted. Pinelands Regional High School science classes used the refuge on occassion for studies of the saltmarsh ecosystem.

3. Outdoor Classrooms - Teachers

In the past, environmental education for teachers in the Barnegat area was conducted by the Brigantine Refuge. The demand now exists for Outdoor Classroom areas that are closer to these districts. The Barnegat Township Board of Education is placing increased emphasis on outdoor classrooms for both teachers and students, and use of the refuge figures prominently in their plans. Better facilities are needed to handle the expected influx of teachers and students to the refuge. An area off of Collinstown Road, with existing roads and short trails was used for these activities in 1981.

On March 13, 1981, a slide program/talk was presented to 65 Barnegat Township elementary school teachers. The program focused on the Environmental Education opportunities at both Brigantine and Barnegat Refuges. On September 21, ORP Chris Sweeny (Brigantine) conducted a 2 hour mini-workshop on bird identification for 35 Barnegat Township teachers.

7. Other Interpretive Programs

Throughout 1981, slide shows and talks concerning refuge wildlife and recreation opportunities were given to; Cub Scouts, Waretown Old Guard, Barnegat Lions Club, Manahawkin Friendly Visitors, Ocean County Federation of Sportsmen's Clubs, NJ Waterfowlers, and others.

8. Hunting

The 4,000 acre Little Egg Harbor Division of the refuge was acquired from The Nature Conservancy in November of 1974. The acquisition of this large tract enabled the refuge to provide waterfowl hunting to the public. In 1976, 2900 acres of marshland in this unit (38% of the total refuge) was opened to waterfowl hunting. The hunting area is divided into 13 units of varying size--each with a suggested method of hunting. Units of the high marsh are considered good "jump" shooting areas. Units which include ponds are excellent for setting up temporary blinds and hunting over decoys. Bayfront units are good areas for pass shooting or shooting over decoys.

Permits are necessary to hunt on opening days, Saturdays, and holidays. A drawing is held prior to the opening of the season and units are assigned to individual hunters. Each master permittee may bring three companions to hunt in the assigned unit. Excluding Christmas and New Years Day, nearly 90% of all units were assigned to permittees. Approximately 50% of those with permits showed up to hunt on their assigned day. No permits are required on weekdays due to low hunting pressure. 1042 hunting visits were reported in 1981. Estimated bag was about 1200 birds--or slightly more than one bird/hunter. Black ducks, lesser scaup, bufflehead, and Atlantic brant are the main species taken. Some Canada and snow geese are shot early in the hunting season.

Two specific problems with the hunting program surfaced in 1981. One was the lack of a standby system for unawarded units. The second was the lack of a hunt report from individual hunters. The absence of a standby system for permit days reduces hunting opportunity, since those who lose out in the drawing have no opportunity to utilize unoccupied units. The lack of a hunt report makes it difficult to know the number of hunters using the area and the number of species of birds taken. These problems will be addressed during revision of the hunting plan prior to the 1982 hunting season.

A controversy of sorts arose in 1981 regarding the closure of refuge lands in Barnegat Township to waterfowl hunting. Accelerated acquisition from 1977 to 1981 resulted in nearly 1100 acres being added to the refuge--with most of this total being north of the Gunning River. Due to a lack of manpower and a "checkerboard" ownership pattern, much of the land went unposted. With the assignment of a permanent manager and the evolution of a contiguous unit, an aggressive posting program was undertaken in the summer of 1981. This resulted in the closing of a 1000+ acres tract to waterfowl hunting. As hunting season approached, people scouting previously hunted areas became aware of the closure. Complaints surfaced, first from individual hunters and then from two hunter groups--The NJ Waterfowlers and the Ocean County Federation of Sportsmen's Clubs. Most hunters that contacted the refuge and took the time to discuss the situation with the manager went away with a better understanding of our program and agreed to give us time to evaluate the situation while utilizing the existing hunting area.

The State Division of Fish, Game and Wildlife became involved, as well as our Area and Regional Offices. Meetings were held with all interested parties in early October. We agreed to consider revising our hunting plan and to seek State input on opening future hunting units. Since revisions were needed, and we had planned to open up parts of the area for hunting during the 1982-1983 season, things turned out well. A much needed dialogue has begun with area hunters and future support for refuge programs should be forthcoming. The area in question remained closed during the 1981 hunting season. Mistake BH

9. Fishing

Although crabbing and clamming occur, saltwater fishing is the major public use activity within approved refuge boundaries. A total of 9,620 visits were reported in 1981. No attempt is made to regulate clamming or fishing in the open bay or tidal streams and ponds as long as the activity is done from a boat and in accordance with state law. Bank fishing and crabbing are discouraged, due to the amount of damage to vegetation that can occur. Violators can be prosecuted for trespassing, although the riparian claims situation (F-11) clouds this approach.

The "Bridge to Nowhere" area at the end of Stafford Avenue in Manahawkin receives the greatest number of fishing/crabbing visits on the refuge. Since this is the only place where a person can walk out on the marsh and crab, it receives extensive use during the summer season. Many of the users are local retirees, and/or seasonal visitors. People crab or fish directly off the birdge or cross and crab from the banks. An area approximately one-half mile long and 10-15 feet wide along the banks of Cedar Creek is denuded of vegetation due to this foot traffic. The lack of vegetation enhances erosion and litter is a major problem.

How to control fishing and crabbing in this area remains a problem. Past attempts to post the area closed failed as the signs disappeared and no one enforced the closure. Although a closure could now be enacted, it is not considered a viable solution. Too many people utilize the area and although the adjacent State area provides some fishing and crabbing opportunity, the closure of this refuge property would deny use of a renewable resource to many individuals who really have no place else to go. Hence the area remained open during 1981. The refuge is exploring ways to upgrade the area and make it a quality site while controlling erosion and litter. Short of installing an extensive (and expensive) boardwalk system, the solution has thus far eluded us.

10. Trapping

The Barnegat Refuge trapping plan was approved in 1978. The plan established three trapping units in the LEH Division of the refuge. Units are awarded on a bid basis. Only one unit may be awarded per trapper. Only muskrats may be taken. Following is a summary of trapping data:

Unit Number	Average Winning Bid	Average Reported Take	# of years trapped
1			
2	$19.50	18	2
3	27.75	24	2
	20.90	20	3

Prior to each trapping season a news release is issued to area newspapers. Previous trappers and others who express interest are sent informational/bid packets.

Bid openings for the 1982 season (January 1 - March 15) were held on December 14, 1981. Unit one was not bid on and will not be trapped in 1982.

Problems still exist in the trapping program. Illegal trapping has occurred since before the refuge was established--its been a way of life for some people for a very long time. Increased enforcement reduced some of the poaching but the illegal trapping is encouraged by the fact that the State trapping season opens one month prior to the refuge season. The practice of delaying openings evolved to eliminate competition between hunters and trappers on State game management areas and was adopted by both Brigantine and Barnegat Refuges for consistency.

11. Wildlife Observation

Demand for wildlife observation activities on Barnegat is on the increase. At present, people who observe wildlife in this area do so from cars on one of six roads that abut the refuge. Barnegat Township's public boat dock is used extensively by people to observe bird life. Observation from watercraft is somewhat less common. Due to a lack of foot trails, very little wildlife observation occurs on foot. Six Special Use Permits were issued for foot travel for wildlife observation in 1981. Two Special Use Permits were issued for photography.

14. Picnicking

Picnicking is basically incidental to other activities on the refuge. Some picnicking occurs on a sandy area of bayfront known as Little Beach and at the bridge to nowhere area. Recreational boaters sometimes anchor on the marsh edge and enjoy lunch while viewing wildlife.

15. Off-Road Vehicles

Off-road vehicle use is not permitted on the area. However, some illegal vehicle trespass occurs on old logging roads along our western boundary.

17. Law Enforcement

Law enforcement on over 9000 acres of basically undeveloped wildlife refuge with only one employee is a challenge. Much of the marsh is

inaccessible at low tides. Upland enforcement is compounded by over seven miles of unmarked boundary through thick swamp woods. This was the first year since refuge establishment that a full-time enforcement officer was available. The increased visibility alone decreased the incidence of trespass, hunting violations, etc. Assistance was rendered by Brigantine Refuge, USFWS Special Agents, State Conservation Officers, and the NJ State Police.

You'll make progress — Keep at it. DeBlieux

Cedar thefts continued to be a problem. Large atlantic coast white cedar is a valuable commodity that is used for; bulkheading, piers, and generally any construction activities near the water. Refuge cedar stands have been prime candidates for the local wood cutters with small mills who exist throughout the area. It's not difficult to steal 20 cedars in a weekend's work for these people.

Two thefts were discovered in 1981. The first occurred in January or February, cutting probably occurred on three or four different occasions. 75 trees were cut with only the butt log taken. Cutters gained access by rebuilding an old logging road into the swamp. In July a smaller theft of 20 more trees occurred in the same area. The perpetrators were able to gain access because extremely dry conditions made the swamp road passable. The access road was torn up in August by the Brigantine YCC.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

Twelve, eight yard loads of road gravel were spread on Collinstown Road in August. This is the first maintenance on this road since it was acquired in 1978. The gravel was spread by the contractor with his front-end loader and numerous low spots and holes were filled.

Posting, both new and maintenance type, was a major activity in 1981. Islands and bayfronts required the most attention due to the actions of wind, tides, and salt spray. Approximately 20 miles of refuge boundary was posted or reposted in 1981. Over 200 galvanized steel sign posts and 400 signs were used. A critical need exists to clear and post over seven miles of forested areas on our western boundary.

4. Equipment Utilization and Replacement

A 4WD Chevy Blazer was obtained in February from the GSA Motor Pool. Maintenance was performed on this rental vehicle by the motor pool. A 16.7 foot Boston Whaler was obtained on "loan" from the Ecological Services office in Absecon. $2000 in parts and labor were needed to put and keep the boat in good operating condition. A 7.5 HP Johnson Motor was purchased for the whaler. It serves as a spare to the 85 HP Evinrude and with the shallow water drive feature, effectively extends the range of the whaler into creeks and bay areas as shallow as one foot deep.

5. Communications Systems

Telephone service was installed in the refuge office, and an answering machine added in September. The machine increased efficiency and solved the problem of a often unmanned office phone. A Motorola radio on the USFWS frequency was installed in the Blazer, and a 5 Watt portable radio borrowed from Brigantine Refuge.

Due to Barnegat's isolation from Brigantine, and the fact that the manager often works alone and/or at night, a second radio frequency is needed for safety and enforcement backup. A two-channel radio with access to a local or regional police department will be necessary in the near future.

6. Energy Conservation

Barnegat Refuge operated under Brigantine's energy conservation program. All goals were met.

7. Other

As mentioned in Section A, an office was opened in February of 1981. A copier was obtained as excess property from Tinicum NEC. Major repairs totaling $800 were required to put the machine in good working order. The following items were also obtained from excess property lists during 1981: file cabinet, two slide projectors, camera, circular saw, drill, belt sander, and a desk. A typewriter and 16mm projector were obtained from Brigantine Refuge. Four interpretive signs identifying the area as Barnegat Refuge were purchased from the National Sign Shop. One was stolen in August and quickly replaced. A 4 by 8 foot informational (hunting) sign was lost into Barnegat Bay during a storm.

J. OTHER ITEMS

2. Items of Interest

Manager Leger attended the Harrisburg Area Office Project Leaders Workshop on November 3rd through 5th.

Manager Leger attended the Disease Contingency Workshop at Brigantine Refuge on April 7th.

3. Credits

This report was prepared by satellite manager Leger. Brigantine staff reviewed the report and offered suggestions for change. Brigantine Clerk Martha Hand typed the report. by hand!

Thorough report, Tony! (& well written) Judy

K. FEEDBACK

In writing this report, I found myself preferring the old familiar format. The new format and instructions call for less "history" and more hard facts relating to changes in the current year. I'm sure that this will be very useful in the future, but since this is the first comprehensive Barnegat narrative, there was a real need to document some of the history of certain refuge programs and activities.

Good!

The main issue facing Barnegat Refuge is mosquito control. The unit has been ditched and sprayed and ditched and sprayed for decades. Some of the activities are just not conducive to good refuge management. The problem is compounded by the summer/recreational aspect of the area, as well as the fear of Encephalitis (last outbreak was in 1969). Maybe it would be cheaper and more environmentally acceptable to control horses! - Not so - we're doing that on Sheldon + it ain't cheap either!

In New Jersey, the county mosquito commissions have an amazing amount of political power. Stopping mosquito control is not politically feasible. In addition, there is the chemical vs. mechanical control situation. Service policy calls for mechanical/biological control over chemical control. Mechanical control has become a science in New Jersey--hence OMWM. At times I think it's just a fancy name for ditching. It does, however, control salt marsh mosquitos. It is for all practical purposes, permanent (20 years). Certain questions remain. Is permanent physical alteration of saltmarsh compatible with protecting saltmarsh? What about the amount of marsh that becomes open water with this method? I suspect that in some cases 10-20% of marsh vegetation becomes shallow water ponds and ditches after management. That's alot of edge but also less saltmarsh. The pros and cons are many and the discussion could ensue for several pages. Perhaps BTI is the answer. One thing is reasonably certain, with increasing numbers of people (both year-round and seasonal) coming to the "Jersey Shore", mosquito control on Barnegat is here to stay.

More!

Tony,
Do facts support this or do significant #'s of mosquitoes persist in spite of efforts. Often activities such as you've described are done to please and pacify people and become habitual without ever accomplish the primary objective ie. mosquito control.
FL

Comments and suggestions are solicited from other personnel both on this and other activities on Barnegat.

Bti is definitely more selective than other chem. alternatives. Along w. mosq. + Blackflies; it does also affect other species in the the Chironomidae family. Some of which are very important duckling food and wintering food. You were on the right track w your study - Monitoring is a must to find out what you have in the way of inverts. first + then what the impacts are. New Jersey's a long way from Alaska.

BW